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IS 2079 (1982): Graphite for pencil slips [CHD 14: Printing, Inks, Stationary and Allied Products]

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Indian Standard

SPECIFICATION FOR GRAPHITE FOR PENCIL SLIPS

(First Revision)

UDC 621·666·2 : 667·562

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

February 1984

Indian Standard

SPECIFICATION FOR GRAPHITE FOR PENCIL SLIPS

(First Revision)

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR GRAPHITE FOR PENCIL SLIPS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 10 September 1982, after the draft finalized by the Pencils Sectional Committee had been approved by the Consumer Products and Medical Instruments Division Council.

0.2 This standard is intended primarily to assist the development of indigenous pencil industry. It was first published in 1962 and has now been revised in view of the technological developments that have since taken place in the country in this field.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements for graphite of two grades intended for use in the manufacture of slips for pencils (lead).

2. GRADES

2.1 Graphite for pencil slips shall be of two grades depending on the fineness and ash content.

2.1.1 Grade 1 graphite shall have ash content of not more than 5 percent by mass. The particle size shall be such that minimum 90 percent of the material passes through sieve of aperture size 53 µm of IS : 460 (Part 1)-1978†.

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*Rules for rounding off numerical values (*revised*).

†Specification for test sieves : Part 1 Wire cloth test sieves (*second revision*).

2.1.2 Grade 2 graphite shall have ash content above 5 percent but not more than 10 percent by mass. The particle size shall be such that minimum 90 percent of the material passes through sieve of aperture size 53 µm of IS : 460 (Part 1)-1978*.

3. MANUFACTURE

3.1 The material shall be manufactured from crystalline quality natural flake graphite.

4. GENERAL REQUIREMENTS

4.1 The material shall be a good quality dry, soft, dark powder with a smooth feel. It shall be free from grit, grease and visible impurities.

5. SPECIFIC REQUIREMENTS

5.1 Loss in Mass on Heating — When tested in accordance with **A-2** of IS : 495-1967†, the loss in mass of the material on heating shall not exceed 3 percent.

5.2 Petroleum Ether Soluble Matter — When tested in accordance with **A-3** of IS : 495-1967†, the petroleum ether soluble matter of the material shall not exceed 0·50 percent by mass.

5.3 Water Soluble Matter — When tested in accordance with **A-4** of IS : 495-1967†, the water-soluble matter of the material shall not exceed 1·25 percent by mass.

5.4 Ash — When tested in accordance with **A-6** of IS : 495-1967†, the ash content of the material shall be as laid down in **2.1.1** and **2.1.2**.

5.5 Fusibility of Ash — The ash shall not fuse below 1 100°C when tested in accordance with the procedure given in Appendix A.

5.6 Non-graphitic Carbon — The non-graphitic carbon content of the material shall not exceed 3 percent by mass when tested in accordance with the procedure given under **A-7** of IS : 495-1967†.

5.7 Blackness of Smear — When tested by the method given in Appendix B, the blackness of the smear shall not be more than 50 percent.

6. SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in Appendix C.

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*Specification for test sieves: Part 1 Wire cloth test sieves (*second revision*).

†Specification for graphite, flake, for lubricants (*first revision*).

7. MARKING

7.1 Each bag shall be marked with the manufacturer's name, initials or trade-mark, quantity packed; and grade of graphite.

7.1.1 The bags may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

8. PACKING

8.1 The graphite shall be packed in sound, clean and dry bags, each containing 50 kg.

APPENDIX A

(*Clause* 5.5)

FUSIBILITY OF ASH

A-1. APPARATUS

A-1.1 Furnace — Either gas or electric furnace which is:

a) capable of maintaining a zone of uniform temperature for heating the ash cones,

b) capable of maintaining a reducing atmosphere surrounding the ash cones during heating,

c) capable of regulation so that the rate of temperature rise shall be not less than 5°C and not more than 10°C per minute, and

d) provided with means of observing the ash cones during heating, shall be used.

A-1.2 Cone Mould — The cone mould shall be suitable for making ash cones 19 mm in height and 6 mm in width at each side of the base which is an equilateral triangle; one side of the cone shall be perpendicular to the base.

A-1.3 Pyrometer — Temperature measurements shall be made with a suitable pyrometer. If a thermocouple is used, it shall be protected from the furnace gases by a glazed porcelain tube and so placed in the furnace that the hot junction is in the immediate vicinity of the cones. The pyrometer equipment shall be calibrated frequently.

A-2. PREPARATION OF ASH

A-2.1 A suitable quantity of the graphite shall be spread out on a fireclay ashing tray. It shall be completely converted to ash in a muffle furnace at a temperature of 800°C. A sample of about 5 to 10 g of the ash shall be transferred to an agate mortar and ground fine.

A-3. PREPARATION OF CONES

A-3.1 The ignited ash shall be moistened with a solution of dextrin (10 percent) containing salicylic acid (0·1 percent) as a preservative and worked into a plastic mass with a spatula. The plastic material shall be moulded into triangular cones. The cones shall be made by firmly pressing the plastic material with a steel spatula into the mould. The surface of the material shall be stuck off smooth, the cones removed from the mould by applying pressure at the base, and placed in a suitable location to dry.

A-3.2 When dry, the cones shall be mounted on a refractory base composed of a mixture of equal parts by mass of kaolin and clay or on a base of refractory brick. When the mixture of kaolin and clay is used as base material, part of the mixture shall be spread out on a sheet iron plate, the cones mounted to not over 3 mm in depth in vertical position in small holes made in the base and the base material pressed into the holes around the bottom of the cones to fill the crevices so that the cones stand firmly. Usually a number of cones may be mounted in one base. When a piece of refractory brick is used as the base, a layer of wet alundum cement about 3 mm in thickness shall be spread on the base and the cones pushed down into it.

A-3.3 The mounted cones shall be dried on a hot-plate or in a drying oven and ignited at a dull-red heat in an open muffle furnace to remove the carbonaceous material.

A-4. METHOD OF HEATING

A-4.1 The mounted test cones shall be placed in the furnace at a temperature of not over 800°C. If the furnace temperature is below 800°C, it may be rapidly increased to 800°C. Then the rate of heating shall be controlled to give a rate of temperature increase of not less than 5°C and not more than 10°C per minute. This rate shall be maintained till the end of the test.

A-4.2 A mild reducing atmosphere shall be maintained surrounding the cones during heating. The ratio by volume of reducing gases to oxidizing gases shall be between the limits of 20 to 80 and 80 to 20. Hydrogen, hydrocarbons and carbon monoxide shall be considered as reducing gases and oxygen, carbon dioxide and water vapour shall be considered as oxidizing gases. Nitrogen is inert.

A-4.3 Softening Temperature — The softening temperature is defined as the temperature at which the cone has fused down to a spherical lump.

APPENDIX B

(*Clause* 5.7)

BLACKNESS OF SMEAR

B-1. APPARATUS

B-1.1 The apparatus consists of:

a) a hollow drum of 80 mm diameter and 100 mm length with two end covers specially designed to keep in position the inside lining of paper,

b) a suitable stand for mounting the drum horizontally and rotating it at a specified rate,

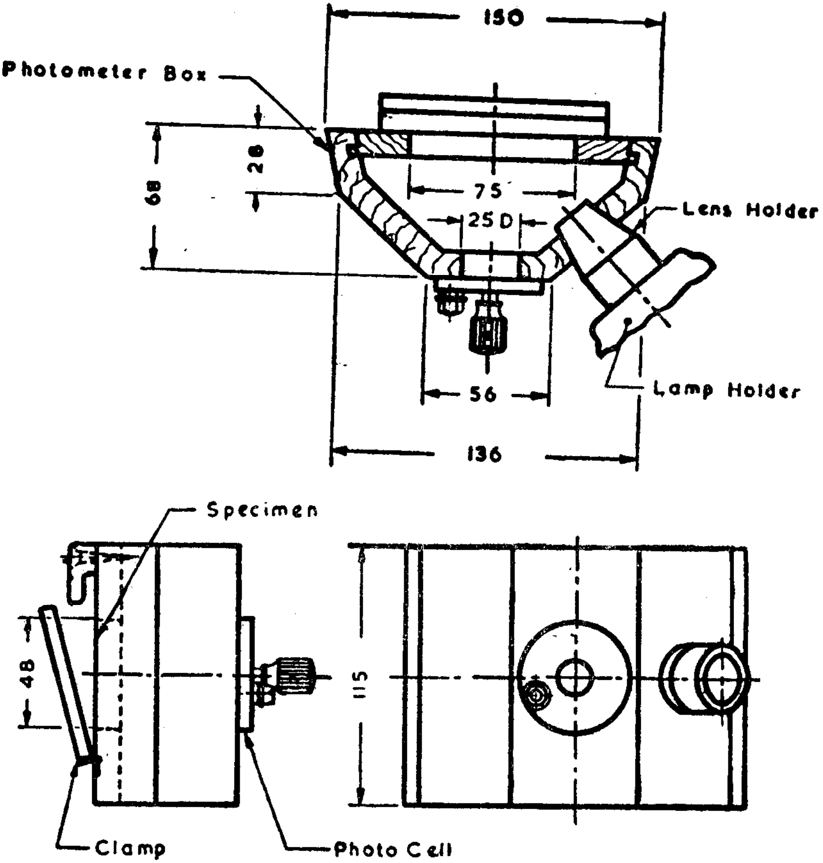
c) a revolution counter for measuring the number of revolutions of the drum, and

d) a bobbin type brass roller of the following dimensions:

Overall length	55 mm
Diameter	25 mm
Length of cut-away portion	45 mm
Reduced diameter	24 mm

B-2. PROCEDURE

B-2.1 Line the drum with Whatman or any other drawing paper of reflectance 79 ± 2. Fix one end cover. Place 10 g of the material in the middle of the drum and place the brass roller in such a way that the material is entirely within the two projecting parts of the roller. Then fix the other end cover and mount the assembly in the stand and revolve 100 times at a speed of about 56 rev/min. Carefully remove the paper from the drum and dust it to remove loose particles. Measure the reflectance of the smeared paper employing the apparatus shown in Fig. 1. The blackness of the smear obtained is then calculated by measuring the reflectance of the paper before and after the experiment. Readings are taken at 4 different points on the same paper and an average value found for the three such papers. The blackness of the smear is expressed as percent reduction in the reflectance of the paper used.



All dimensions in millimetres.

FIG. 1 BLACKNESS INDICATOR

APPENDIX C

(*Clause* 6.1)

SAMPLING OF GRAPHITE FOR PENCIL SLIPS

C-1. GENERAL REQUIREMENTS OF SAMPLING

C-1.0 In drawing, preparing, storing and handling test samples, the following precautions and directions shall be observed.

C-1.1 Samples shall not be taken in an exposed place.

C-1.2 The sampling instrument shall be clean and dry when used.

C-1.3 Pecautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contaminations.

C-1.4 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

C-1.5 The samples shall be placed in suitable clean, dry and airtight metal or glass containers, on which the material has no action.

C-1.6 The sample containers shall be of such a size that they are almost completely filled by the sample.

C-1.7 Each sample container shall be sealed airtight by suitable means after filling and marked with full details of sampling, the date of sampling and the year of manufacture of the material.

C-1.8 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

C-2. SCALE OF SAMPLING

C-2.1 Lot — All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the containers in each batch shall constitute a separate lot.

C-2.2 Gross Sample — A number of containers, not less than the sample size indicated in Table 1, shall be selected at random from a lot for the purpose of drawing samples for test. These containers shall constitute the gross sample.

TABLE 1 MINIMUM NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING FROM VARIOUS SIZES OF LOTS

LOT SIZE	SAMPLE SIZE
2 to 8	2
9 „ 27	3
28 „ 64	4
65 „ 125	5
126 „ 216	6
217 „ 343	7
344 „ 512	8
513 „ 729	9
730 „ 1 000	10
1 001 „ 1 331	11

C-3. TEST SAMPLES AND REFEREE SAMPLE

C-3.1 Preparation — Draw, with an appropriate sampling instrument, small portions of the material from different parts of each container in the gross sample, selected for sampling and freshly opened. The sample prepared by mixing the portions from each container selected for sampling shall be about 1 kg. Divide this composite sample into the required number of reduced samples.

C-3.2 Three sets of test samples, not less than 250 g each, representative of each container selected for sampling, shall be transferred immediately to thoroughly dried metal containers or glass bottles, which are sealed air-tight by suitable means or with glass stoppers. These shall be labelled with all the particulars of sampling given under **C-1.7**. One set of the test samples shall be sent to the purchaser and one to the supplier.

C-3.3 Referee Sample — The third set of the test sample, bearing the seals of the purchaser and the supplier, shall constitute the referee sample, to be used in case of dispute between the purchaser and the supplier and it shall be kept at a place agreed to between the purchaser and the supplier.

C-4. TESTS FOR ACCEPTANCE

C-4.1 Examination and Tests — The purchaser may examine and test each of the reduced samples constituting a test sample separately for compliance with the requirements of this standard or he may prepare, for the purpose of such examination and at any stage of the progress of the examination, a composite sample representative of the whole lot, by mixing all the reduced samples constituting the test sample.

C-4.2 Criterion for Judgement — When the individual reduced samples in the test sample are separately examined and the results vary from one reduced sample to another, the criterion for judging the quality of the lot for the purpose of acceptance on the basis of the results obtained shall be at the discretion of the purchaser, unless otherwise previously agreed to between the purchaser and the supplier.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/M^2

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